IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

THOMAS A. GENISE

Application No: 08/666,164   Group Art Unit: 3502

Filed: June 19, 1996   Examiner: T. Kwon

For: AUTOMATED TRANSMISSION SYSTEM CONTROL WITH ZERO ENGINE
      FLYWHEEL TORQUE DETERMINATION

**EXHIBITS A-E AND 1-30
REQUEST FOR INTERFERENCES
PURSUANT TO 37 C.F.R. §§1.607 AND 1.608**

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August 11, 1993

TO: H. Gordon---Eaton Center

FROM: J. McReynolds---Eaton TCONA

RE: Auto Stick Disclosure

Howard, I am going to ask CoRDC to simulate the attached product on the driving simulator so I can demonstrate this driving concept at an upcoming product planning meeting at TCONA.   Before communications start, I'm disclosing it to you.

Attached is a description of how it works.   Please take whatever action is needed and Iet me know how this looks.

Thanks

JRM

SUPER FAMILY ENHANCEMENT
SUPER 10

Objectives are:

(1.) A transmission-based system which equals (exceeds) the
     highway fuel economy of engine-based top 2

(2.) Minimal manufacturing cost premium over the Super 10
     top 2: about $100

(3.) Automation of all splitter shifts in the Super 10 for
convenience and additional fuel saving

(4.) A constant mesh, lever shift transmission that does not
     require the driver to be able to break torque or
     synchronize throttle and lever movements

(5.) A conventional manual clutch that is needed only to start
the vehicle moving

(6.) Above product desired in production by end of 1995

CONCEPT NAME: AUTO STICK

PRELIMINARY DESCRIPTION OF SYSTEM

SUPER 10 RTL/O-14610B, RTLO-14610A

NORMAL SHIFT LEVER IN CAB

SHIFT KNOB HAS NO RANGE OR SPLITTER BUTTON

HAS PAD SWITCH UNDER SHIFT KNOB MEDALLION

CAB-MOUNTED TRANSMISSION ECU (Preliminary request)

SPLITTER CYLINDER IS CONTROLLED BY ELECTRIC SOLENOID(s), 12 v. FROM ECU

J-1939 LINE FROM TRANSMISSION ECU TO VEHICLE

ENGINE RPM

CLUTCH (SWITCH) POSITION

ENGINE RPM RECOMMENDATION (FOR FUEL)

FAN ON/OFF ON COMMAND

SENSORS CONNECTED TO TRANS. ECU:

SPEEDOMETER SENSOR (1 PER TRUCK)

SPEED SENSOR FOR FRONT BOX MAINSHAFT RPM

SPEED SENSOR FOR AUX REDUCTION DRIVE GEAR (OR AUX C.S.)

O P E R A T I O N

DRIVER ACTIONS ARE IN BOLD

[TRANSMISSION ACTIONS ARE IN BRACKETS]

START VEHICLE THE NORMAL WAY, WITH CLUTCH

ACCELERATE VEHICLE

THE DRIVER HAS NO RESPONSIBLITY ON THE AUTOMATIC SHIFTS, KEEPS FOOT ON THROTTLE

FIRST (AUTOMATIC SPLITTER) SHIFT:

[AT 1475 RPM THE TRANSMISSION ECU PRESELECTS THE SPLITTER, FUELS/DEFUELS ENGINE OVER J-1939 LINK, SENSES SPEED ERROR BETWEEN MAINSHAFT AND MPH AND TURNS ENGINE FAN ON FOR 1 SECOND. TRANSMISSION ECU LOOKS FOR FOR ZERO SPEED ERROR AND THEN RETURNS

THE THROTTLE TO DRIVER'S CONTROL.)

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SECOND SHIFT (DRIVER INITIATED)

VEHICLE APPROACHES 1800 RPM.

LEVER UPSHIFT: DRIVER GRASPS SHIFT KNOB & APPLIES PRESSURE TO MOVE OUT OF GEAR. THIS ACTIVATES THE SWITCH ON TOP OF SHIFT KNOB. DRIVER DOES NOT HAVE TO RELEASE THE THROTTLE.   DRIVER DOES NOT PRESS THE CLUTCH PEDAL AT ANY TIME DURING THE SHIFT.

[TRANSMISSION POWERS SPLITTER SOLENOID AND FUELS/DEFUELS ENGINE. AS SOON AS TRANSMISSION SEES SPEED ERROR WITH SPEEDOMETER IT STOPS THE MOVEMENT OF THE SPLITTER CLUTCH (USING A MEANS YET TO BE DETERMINED.)]

THE DRIVER MOVES SHIFT LEVER INTO ANOTHER LEVER POSITION WITHOUT GEAR RAKING AND WITHOUT ANY REQUIREMENT TO TIME LEVER ENTRY INTO THE NEXT POSITION.

[TRANSMISSION MONITORS ENGINE AND MAINSHAFT RPM TO DETERMINE WHEN LEVER GETS INTO GEAR, AND TO SEE WHICH GEAR. TRANS. DECIDES WHETHER TO SHIFT SPLITTER TO DIRECT OR OVERDRIVE AND ORDERS THE ENGINE TO THE CALCULATED NEW RPM. WHEN TRANSMISSION SEE ZERO SPEED ERROR, IT RETURNS CONTROL OF THROTTLE TO THE DRIVER.]

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DOWNSHIFTS

AUTOMATIC (SPLITTER) DOWNSHIFT:

THE TRANSMISSION DECIDES THE DOWNSHIFT POINT CONSIDERING MPH, RPM AND THE THROTTLE POSITION.

[TRANSMISSION POWERS THE SPLITTER SOLENOID, FUELS/DEFUELS ENGINE, COMMANDS ENGINE UP, SENSES ZERO SPEED ERROR AND RETURNS THROTTLE TO DRIVER.]

DOWNSHIFTS

LEVER DOWNSHIFTS:

FROM ENGINE SOUND, FEEL AND SPEEDOMETER, DRIVER DETERMINES IT'S TIME TO DOWNSHIFT, GRASPS SHIFT KNOB & APPLIES PRESSURE TO MOVE OUT OF GEAR. THE DRIVER'S HAND ACTIVATES THE SWITCH ON TOP OF THE KNOB. DRIVER DOES NOT HAVE TO RELEASE THROTTLE. DRIVER DOES NOT PRESS THE CLUTCH PEDAL AT ANY TIME DURING THE SHIFT.

[TRANSMISSION POWERS SPLITTER SOLENOID AND FUELS/DEFUELS ENGINE. AS SOON AS TRANSMISSION SEES SPEED ERROR BETWEEN FRONT BOX AND SPEEDOMETER, IT STOPS MOVEMENT OF THE SPLITTER CLUTCH (USING A MEANS TO BE DETERMINED).]

THE DRIVER MOVES SHIFT LEVER INTO ANOTHER LEVER POSITION WITH LITTLE EFFORT, WITHOUT GEAR RAKING AND WITHOUT ANY REQUIREMENT TO TIME ENTRY.

[TRANSMISSION MONITORS ENGINE AND MAINSHAFT RPM TO DETERMINE WHEN LEVER GETS INTO GEAR AND WHICH RATIO IT IS IN. TRANS. DECIDES WHETHER TO SHIFT SPLITTER INTO DIRECT OR OVERDRIVE AND ORDERS THE ENGINE TO GO TO THE CALCULATED NEW RPM. WHEN TRANS SEES ZERO SPEED ERROR, IT RETURNS THROTTLE CONTROL TO THE DRIVER.]

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EXAMPLES OF SOME UNPLANNED, UNUSUAL EVENTS:

EVENT 1: DRIVER PUSHES IN CLUTCH

[TRANSMISSION STAYS WHERE IT IS]

EVENT 2:

THE DRIVER HAS SELECTED A FRONT BOX RATIO THAT IS TOO HIGH FOR THE VEHICLE SPEED:

[TRANSMISSION DROPS ENGINE TO IDLE. TRANS POWERS THE SPLITTER SOLENOID TOWARD OVERDRIVE (IF TRANS IS NOT ALREADY IN OVERDRIVE) AND ATTEMPTS TO GET SPLITTER INTO OVERDRIVE GEAR.]

DRIVER IS RESPONSIBLE TO SELECT A LOWER LEVER POSITION THAT IS USABLE.

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EVENT 3:

THE DRIVER HAS SELECTED A FRONT BOX RATIO THAT IS TOO LOW FOR THE VEHICLE SPEED:

[TRANSMISSION RAISES ENGINE TO MAXIMUM GOVERNOR OVERRUN RPM. TRANS. CONTINUES THIS ACTION UNTIL DRIVER SHIFTS THE LEVER INTO A GEAR THAT IS WITHIN THE RANGE OF THE ENGINE. TRANS. THEN ADJUSTS ENGINE RPM AND SHIFTS SPLITTER INTO APPROPRIATE GEAR.]

FROM THE FIVE LEVER POSITIONS, THE DRIVER IS RESPONSIBILE TO SELECT A HIGHER GEAR, ONE THAT IS USABLE.

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EVENT 4:

WITH THE VEHICLE IN TOP GEAR, CRESTING A HILL AND GOING TOO FAST FOR A LEVER DOWNSHIFT, THE DRIVER

1) HAS RESTED HIS HAND ON THE SHIFT KNOB ACTIVATING THE SWITCH

[THE TRANSMISSION TAKES NO ACTION, SPLITTER STAYS IN GEAR.]

2) THE DRIVER APPLIES PRESSURE ON LEVER AND SHIFTS TRANSMISSION INTO NEUTRAL

[TRANSMISSION KEEPS SPLITTER WHERE IT IS, IN OVERDRIVE. TRANSMISSION RAISES ENGINE RPM ATTEMPTING TO MATCH THE MPH OF THE VEHICLE AS HIGH AS THE TRANSMISSION CAN COMMAND THE ENGINE TO GO FOR EMERGENCY SITUATIONS (PROPOSED TO BE 2200 RPM)

THE DRIVER IS RESPONSIBLE TO MOVE THE LEVER BACK INTO 5th (TOP) GEAR. THE DRIVER IS RESPONSIBLE TO USE THE BRAKES TO KEEP THE VEHICLE UNDER 90 MPH. DRIVER ENCOUNTERS NO RESISTENCE AND GETS INTO GEAR CLEANLY PROVIDED HE FULFILLS THE ABOVE.

(BEAR IN MIND, FOR MPG ECONOMY REASONS, THE DRIVER IS ALWAYS LIMITED TO 1650 RPM OR LESS IN TOP GEAR. WITH THIS SYSTEM, THE TRANSMISSION CAN REQUEST UP TO 2200 RPM FROM THE ENGINE FOR EMERGENCY SCENARIOS SUCH AS THIS ONE. AS SOON AS IT SENSES ZERO SPEED ERROR FOR A COUPLE SECONDS AND RETURNS CONTROL TO THE DRIVER, THE 1650 RPM LIMIT AGAIN TAKES EFFECT.)]

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